their lengths the long chromospheric arcs seen near the end of totality; this point of re-appearance gives the time of third contact. Immediately preceding this, however, and in the same position, a great many short arcs parallel to the long chromospheric ones will flash in momentarily; these represent the spectrum of the reversing layer, and may be used as a warning that the photosphere will reappear within a few seconds after.

That this method is really capable of giving a fairly accurate result can be gathered from the "Preliminary Report on the

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Ephemeris for Physical Observations of Jupiter,

Greenwich Noon	P	L−O	B	Apparent Diameter. Equat. 2a.	Defect.	Polar 2b.	d	w	B′
1897.	°	°	°	″	″	″	°	°	°
Dec. 10	25·114	51·782	−2·332	35·28	0·26	33·07	9·87	268·44	−2·49
12	25·096	52·029	2·348	35·47	·27	33·25	9·97	268·40	2·50
14	25·079	52·269	2·363	35·67	·27	33·43	10·06	268·36	2·52
16	25·062	52·499	2·378	35·86	·28	33·61	10·14	268·32	2·54
18	25·046	52·719	2·393	36·07	·28	33·81	10·20	268·28	2·55
20	25·030	52·930	2·408	36·28	·29	34·00	10·25	268·24	2·57
22	25·015	53·130	2·422	36·49	·29	34·20	10·30	268·20	2·58
24	25·000	53·320	2·436	36·70	·30	34·40	10·34	268·16	2·60
26	24·985	53·499	2·450	36·92	·30	34·60	10·37	268·12	2·61
28	24·971	53·668	2·464	37·13	0·30	34·81	10·38	268·08	2·63
30	24·958	53·825	2·477	37·36	0·31	35·02	10·39	268·05	2·64
1898.									
Jan. 1	24·945	53·971	2·490	37·58	·31	35·23	10·39	268·01	2·66
3	24·933	54·106	2·503	37·81	·31	35·44	10·38	267·97	2·67
5	24·922	54·229	2·516	38·04	·31	35·66	10·35	267·92	2·68
7	24·913	54·341	2·528	38·27	·31	35·87	10·31	267·88	2·70
9	24·904	54·440	2·540	38·51	·31	36·09	10·25	267·84	2·71
11	24·896	54·528	2·552	38·74	·31	36·32	10·19	267·79	2·72
13	24·889	54·603	2·564	38·97	0·30	36·54	10·12	267·74	2·73
15	24·883	54·666	2·575	39·21	·30	36·76	10·04	267·69	2·75
17	24·878	54·717	2·585	39·46	·30	36·98	9·92	267·63	2·76
19	24·875	54·755	2·595	39·70	·29	37·21	9·82	267·57	2·77
21	24·873	54·780	2·605	39·94	·29	37·44	9·69	267·51	2·78
23	24·872	54·793	2·614	40·18	·28	37·66	9·55	267·45	2·79
25	24·872	54·793	2·623	40·41	·27	37·88	9·40	267·38	2·80
27	24·872	54·780	2·632	40·65	·26	38·11	9·23	267·30	2·81
29	24·874	54·754	2·640	40·89	0·26	38·33	9·05	267·22	2·82
31	24·877	54·716	2·648	41·12	·25	38·55	8·86	267·14	2·82

Results obtained in Novaya Zemlya during the Eclipse of the Sun, 1896 August 9, with the Prismatic Camera."*

Note.—If all the contacts are to be determined, the first and fourth might be done by Young's method, and for estimating the second and third the same spectroscope could be employed with a very wide tangential slit at the points of disappearance and re-appearance of the photosphere, or to give even a larger range of observation the slit might be removed altogether.

* *Phil. Trans.* vol. 189, p. 261. A. 1897.

Observations of Jupiter, 1897–98. By A. C. D. Crommelin.

Greenwich Noon.	Longitude of ♃'s Central Meridian. 877°·90 I.	870°·27 II.	Corr. for Phase.	Light-time	A − O	*B*
1897	°	°	°	m	°	°
Dec. 10	147·53	139·91	+0·42	47·22	41·908	−2·055
12	103·23	80·35	·43	46·97	42·060	2·061
14	58·95	20·81	·44	46·71	42·211	2·067
16	14·68	321·28	·45	46·45	42·362	2·073
18	330·42	261·76	·45	46·18	42·514	2·079
20	286·17	202·25	·46	45·92	42·665	2·085
22	241·93	142·75	·46	45·66	42·817	2·091
24	197·70	83·26	·46	45·39	42·967	2·097
26	153·48	23·78	·47	45·12	43·119	2·103
28	109·28	324·31	0·47	44·85	43·270	2·109
30	65·09	264·86	·47	44·59	43·421	2·115
1898 Jan. 1	20·90	205·41	·47	44·32	43·572	2·121
3	336·73	145·98	·47	44·06	43·723	2·127
5	292·57	86·56	·47	43·79	43·875	2·133
7	248·42	27·14	·46	43·52	44·026	2·139
9	204·28	327·74	·46	43·26	44·177	2·145
11	160·15	268·36	·45	42·99	44·328	2·151
13	116·04	208·98	0·45	42·74	44·479	2·156
15	71·93	149·61	·44	42·47	44·631	2·162
17	27·84	90·26	·43	42·22	44·781	2·167
19	343·76	30·92	·42	41·96	44·933	2·173
21	299·69	331·58	·41	41·71	45·084	2·178
23	255·63	272·26	·40	41·46	45·235	2·184
25	211·57	212·95	·38	41·22	45·387	2·190
27	167·53	153·65	·37	40·97	45·537	2·195
29	123·51	94·35	0·36	40·74	45·688	2·201
31	79·49	35·07	·34	40·50	45·840	2·206

Greenwich Noon.	P	L−O	B	Apparent Diameter. Equat. 2a.	Defect.	Polar 2b.	d	w	B′
1898.	°	°	°	″	″	″	°	°	°
Feb. 2	24·881	54·665	2·655	41·35	·24	38·77	8·66	267·05	2·83
4	24·887	54·602	2·662	41·58	·23	38·97	8·45	266·96	2·84
6	24·894	54·525	2·668	41·80	·22	39·18	8·23	266·87	2·85
8	24·902	54·437	2·674	42·02	·20	39·40	8·00	266·77	2·85
10	24·911	54·336	2·679	42·24	·19	39·60	7·75	266·67	2·86
12	24·921	54·224	2·683	42·45	·18	39·79	7·49	266·56	2·86
14	24·931	54·100	2·687	42·66	0·17	39·98	7·22	266·44	2·87
16	24·942	53·965	2·690	42·86	·16	40·18	6·93	266·31	2·87
18	24·954	53·818	2·693	43·05	·14	40·35	6·63	266·18	2·87
20	24·967	53·661	2·695	43·24	·13	40·53	6·31	266·03	2·87
22	24·981	53·493	2·696	43·42	·12	40·70	5·99	265·86	2·87
24	24·995	53·315	2·697	43·60	·11	40·87	5·66	265·66	2·88
26	25·010	53·128	2·698	43·76	·09	41·02	5·32	265·42	2·88
28	25·026	52·931	−2·698	43·91	·08	41·16	4·97	265·15	−2·88

The constants and notation are the same as those employed last year by Mr. Marth (*Monthly Notices*, vol. lvi. No. 10, p. 516). P. denotes the position angle of *Jupiter's* axis ; L−O+180° the jovicentric longitude of the Earth reckoned in the plane of the planet's equator from O, the point of the vernal equinox of *Jupiter's* northern hemisphere ; Λ−O+180° the jovicentric longitude of the Sun from the same point ; B, *B* the jovicentric latitudes of the Earth and Sun above the equator.

The formulæ for finding the distances of the tangents to the limbs in right ascension and declination and in other directions, and also the defect of illumination, were given by Mr. Marth in *Monthly Notices*, vol. xl. p. 490 ff, and in vol. xlv. p. 408.

The longitudes of *Jupiter's* central meridian are computed with unaltered values of the rates of rotation and of the zero meridians in the two adopted systems. The addition of the "Corr. for Phase" gives the longitudes of the meridians, which bisect the illuminated disc.

Greenwich Noon.	Longitude of ♃'s Central Meridian. 877°·90 I.	870°·27 II.	Corr. for Phase.	Light—time	A−O	B
1898.	°	°	°	m	°	°
Feb. 2	35·47	335·80	·33	40·28	45·991	2·212
4	351·47	276·53	·31	40·06	46·141	2·218
6	307·48	217·28	·29	39·85	46·293	2·223
8	263·49	158·04	·28	39·64	46·444	2·229
10	219·52	98·80	·26	39·43	46·595	2·234
12	175·55	39·57	·24	39·24	46·746	2·240
14	131·59	340·35	0·23	39·05	46·897	2·246
16	87·64	281·14	·21	38·86	47·048	2·251
18	43·69	221·93	·19	38·69	47·199	2·257
20	359·75	162·73	·17	38·52	47·350	2·262
22	315·82	103·53	·16	38·36	47·501	2·268
24	271·89	44·34	·14	38·20	47·652	2·274
26	227·96	345·15	·12	38·06	47·803	2·279
28	184·04	285·97	+0·11	37·9	47·954	−2·285

The following example illustrates the method of finding the Greenwich mean times, at which the zero meridian of either system passes the middle of the illuminated disc:—

To find the passage of the zero meridian of System II. across the middle of the illuminated disc which occurs next after noon on 1898 January 1.

Longitude of central meridian corrected for Phase $=205°·88$ Defect from $360°=154°·12$. Rotation in $48^h=1,740°·57$. Hence interval after noon at which the passage takes place

$$=\frac{48^h \times 154·12}{1740·57}=4^h·2502=4^h\ 15^m·0$$

We can find subsequent passages by interpolating for the time required to rotate through 360°.

7 Vanbrugh Park Road, Blackheath:
1897 *November* 26.